

Name: _____

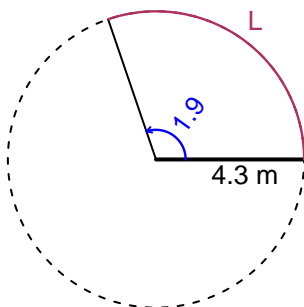
Date: _____

Trig Final (Solution v46)

- You should have a calculator (like [Desmos](#)) and a [unit-circle](#) reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The angle measure is 1.9 radians. The radius is 4.3 meters. How long is the arc in meters?

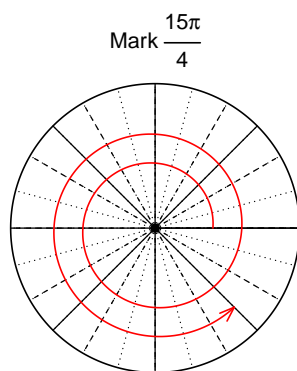


$$\theta = \frac{L}{r} \quad r = \frac{L}{\theta} \quad L = r\theta$$

$L = 8.17$ meters.

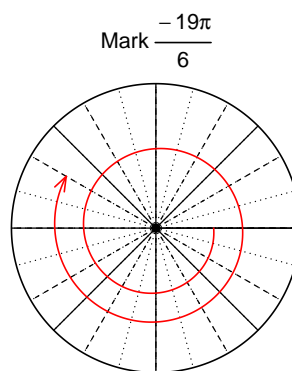
Question 2

Consider angles $\frac{15\pi}{4}$ and $-\frac{19\pi}{6}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(\frac{15\pi}{4}\right)$ and $\sin\left(-\frac{19\pi}{6}\right)$ by using a unit circle (provided separately).



Find $\cos(15\pi/4)$

$$\cos(15\pi/4) = \frac{\sqrt{2}}{2}$$



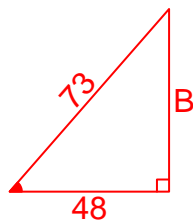
Find $\sin(-19\pi/6)$

$$\sin(-19\pi/6) = \frac{1}{2}$$

Question 3

If $\cos(\theta) = \frac{48}{73}$, and θ is in quadrant IV, determine an exact value for $\sin(\theta)$.

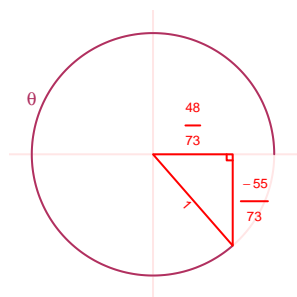
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$\begin{aligned}48^2 + B^2 &= 73^2 \\ B &= \sqrt{73^2 - 48^2} \\ B &= 55\end{aligned}$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant IV in a unit circle.



$$\sin(\theta) = \frac{-55}{73}$$

Question 4

A mass-spring system oscillates vertically with a frequency of 7.8 Hz, an amplitude of 3.25 meters, and a midline at $y = -5.67$ meters. At $t = 0$, the mass is at the minimum height. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = -3.25 \cos(2\pi 7.8t) - 5.67$$

or

$$y = -3.25 \cos(15.6\pi t) - 5.67$$

or

$$y = -3.25 \cos(49.01t) - 5.67$$